Pend d'Oreille

Wildlife Management Plan

Ministry of
Environment

PEND D'OREILLE WILDLIFE MANAGEMENT PLAN

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Prime white-tailed deer winter range, with dense forests on southwest aspects on the left and a mixture of forest and openings on the south aspect to the right.

The Seven Mile Hydro-electric Project is located on the Pend d'Oreille River near Trail in southeastern British Columbia. The project features a 65 m concrete gravity dam creating a head pond that has flooded the valley 13 km upstream to the Canada/USA boundary. Flooding, access construction, and work areas have changed 300 hectares of the valley resulting in the loss of more than 10% of the winter habitat of 1300 white-tailed deer (Odocoileus virginianus). Construction work commenced in 1975 and the first two generating units began service in 1980.

HISTORY

In the spring of 1974, B.C. Hydro and Power Authority (B.C. Hydro) applied to the Government of British Columbia for a water licence permitting the construction of the Seven Mile Project. In recognition of the potential environmental problems associated with the project B.C. Hydro had carried out environmental studies assessing impacts on wildlife, fish and recreation in 1973-1974. In July 1974 a public water licence hearing was held.

Central in the concerns of biologists and naturalists representing the Fish and Wildlife Branch, public groups, and B.C. Hydro at the hearing were impacts of the project on critical white-tailed deer winter range. Fishery concerns were minimal and were judged by all parties not to be a problem. Road access to the project and its impact on deer was the controversial issue at the hearing. Three alternative routes considered were a road parallel to the north side of the Pend-d'Oreille river, a road parallel to the south side, and one approaching from the north via Nine Mile Creek (Fig. 1). It was concluded during the hearing that the "south side" route was best environmentally, the "north side" was best financially while the Nine Mile Creek route was judged unacceptable from a social point of view. A Conditional Water Licence was issued to B.C. Hydro authorizing diversion and use of water subject to, among other conditions, construction of either a north or south side road and funding of a wildlife habitat protection or enhancement program.

After B.C. Hydro re-evaluated access alternatives a second public hearing was held before the Comptroller of Water Rights in April 1975, to decide the access route question. The dam per se was not an issue at this hearing, but factors such as deer habitat loss, direct deer mortality, disturbance to deer, construction costs, and human safety were considered relative to the two remaining access alternatives. The Comptroller's ruling, May 1975, supported B.C. Hydro's application for a route on the north side of the valley immediately adjacent to the existing Waneta Reservoir on the Pend d'Oreille River. His decision also directed:

> ".....that the licencee shall make available to the Department of Recreation and Conservation a total of one million

> eight hundred thousand dollars (1,800,000) in accordance with budgets submitted annually by that Department for planning and implementing a fish and wildlife habitat management program for the Pend d'Oreille Valley, having due regard for the principles of integrated resource management."

Following this directive, appeals to a the provincial Cabinet were launched by the Trail Wildlife Association and the Fish and Wildlife Branch. After evaluating all the evidence available the Environment and Land Use Committee (ELUC) disallowed the appeals and referred "the question of compensation for the loss of use of the natural amenities of the fish and wildlife habitat" to the Environment and Land Use Secretariat.

The final decision on compensation was handed down by the ELUC in September 1977 and upheld the previous compensation award. The money was established as an investment fund with B.C. Hydro paying an interest rate tied to their yearly adjusted borrowing rate. Unused interest during any given year is maintained in the fund and is added to the capital. Money spent above the yearly interest yield, such as major land purchases, reduces the capital. The arrangement allows the Fish and Wildlife Branch, on behalf of the provincial government, to own and manage land on a long-term basis, to develop an intensive habitat management plan, to carry out the plan, to conduct required research and to monitor the results of management efforts without affecting normal Branch budgets.

PEND D'OREILLE AREA OF INFLUENCE

The Pend d'Oreille Coordinated Resource Management Plan covers an area of 220 sq. km from the Canada-USA border on the south to the height of land between the Beaver and Pend d'Oreille valleys on the north. On the west the Columbia River forms the boundary while on the east the Salmo River and Highway 6 are the boundaries (Fig. 2). This area includes all the Pend d'Oreille white-tailed deer winter range as well as a sizeable area of surrounding forested land. Deer migration to the winter range in fall occurs from a summer range area of about 565 sq. km (Fig. 3). Actions on the winter range effect this larger area of influence since the white-tailed deer rely on adequate winter range for survival.

The Pend d'Oreille River is the major feature of the area, flowing north from the U.S. and then generally west to the Columbia River. A 21 km loop is formed by the river in Canada. The Salmo River flows into the Pend d'Oreille from the east, adding about 6 km to the winter range area. The important winter range is formed by the south aspects of the valley from the Columbia River to the Salmo River.

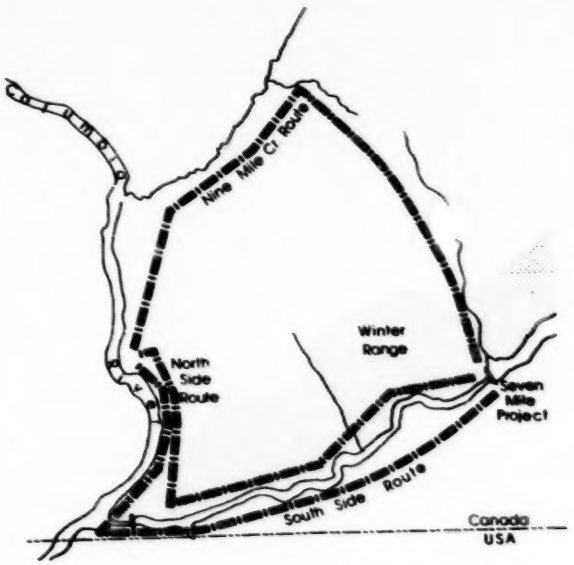

Figure 1

Access routes to Seven Mile Dam considered during Water License Hearings.

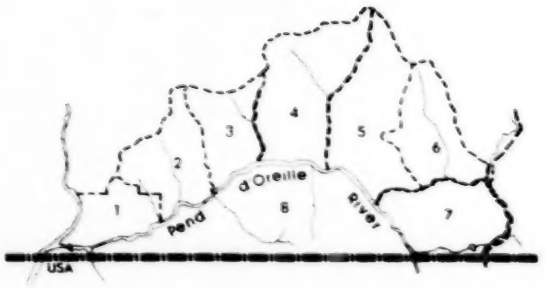

Figure 2

The Pend d'Oreille Co-ordinated Resource Management Plan area and the eight Units defined for management purposes.

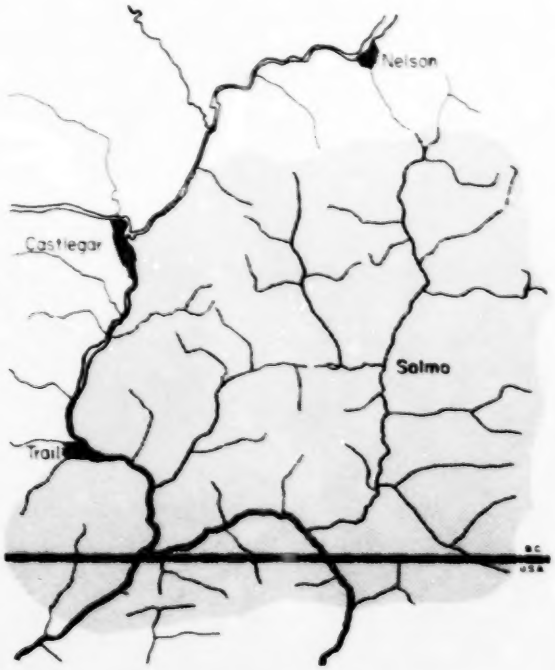

Figure 3

Summer range used by white-tailed deer which winter in the Pend d'Oreille Valley.

Topographically the entire area is mountainous with glacially carved valleys. Elevations are moderate with only small areas above the 1950 m tree line. The mountains are rounded with few rugged peaks or serrated ridges. Most of the area is in the Selkirk mountains, although some deer summer in the Monahsee mountains west of the Columbia River. In this portion of these mountain ranges, a transition occurs between the rugged northern Selkirks and southern extensions of the range bordering the Columbia lava plain in Washington State (Holland, 1976). Mountain slopes are generally moderately to steeply sloping and valley bottoms are narrow. The variety of slopes and aspects provide a wide range of habitats but extensive areas of high quality valley bottom summer ranges do not exist.

Soils and surficial topographic features are primarily glacial in origin. Vold et al. (1981) described the soils of the Pend d'Oreille valley in some detail. Their findings indicate extensive areas of colluvial deposits on most strong to steep slopes (16-100%). Morainal deposits make up about one-third of the soils present and represent unsorted sediments deposited directly from glaciers. Fluvial and glaciofluvial deposits are the third major surficial material type in the valley. Fluvial deposits are not prominent as the present river and creeks cut deeply into the valley and are too narrow to form a significant flood plain. Glaciofluvial deposits form kame terraces through much of the valley at low elevation. Inactive fluvial deposits also occur on nearly level to gentle slopes. They are generally sorted sands and/or gravels while glaciofluvial deposits are poorly sorted. Lacustrian sediments, organic soils and eolian (wind deposited) soils are all of limited extent in the valley. Lacustrian deposits are used as licks where they occur. Volcanic ash deposited by the wind have mixed with a silt loam veneer and overlay gentle to steep slopes throughout the valley forming a layer 20 to 50 cm thick (Vold et al. 1981).

The Pend d'Oreille valley and summer ranges to the north lie within the Interior Wet Belt Region as indicated by the characteristic Interior Western Hemlock/Western Red Cedar forest zone. Other forest zones represented in the area are the Interior Grand Fir/Western Red Cedar and the subalpine Engelman Spruce/Alpine Fir zone (Vold et al, 1981). Edaphic climax Rocky Mountain Douglas-fir (Pseudotsuga menziesii) occurs on dry south aspects in some areas. Toxic fumes from Cominco in Trail, forest fires and soil erosion have modified the vegetation present in most areas throughout the valley resulting in seral vegetation stages. Most of the seral vegetation types are of greater value to deer and other wildlife species than the climatic climax vegetation. The vegetation mosaic present at this time provides habitat of only moderate quality for wintering deer due to a lack of significant successional interruption in the past 45 years. Vold et al. (1980) document the vegetation present and have mapped the vegetation complexes at a scale of 1:20,000.

Climatic conditions in the valley result in a gradient in forest vegetation from the dry west end to the more moist east end. The majority of the deer winter range occurs in the dry forest zones as snow accumulation is lower, snow melt is more rapid and the tree species provide better snow interception.

Climate in the Pend d'Oreille valley and summer ranges surrounding the valley is dominated by the mountains and valleys encountered by storm systems moving from the west. The predominant polar air mass directs cool moist Pacific air across the mountains where precipitation occurs on the western slopes. Valleys oriented in an east/west direction benefit from the drying, warming influence of air moving down eastern slopes. As a result, areas such as the Pend d'Oreille receive less snowfall than surrounding mountains and valleys with a north/south orientation. Total average annual precipitation at the west end of the valley is 630 mm; 28% of which occurs as snow. May, June, November and December are the wettest months while April, July, August and September are the dryest months (Environment Canada). The middle of the Pend d'Oreille valley receives 8% more precipitation and the east end 12% more precipitation than the west end (Vold et al. 1980). Temperatures in the valley are moderate in winter and warm in summer (average daily maximum and minimum, July, 29.0°C and 10.3°C; January, 1.6°C and -7.9°C). The average freeze free period is 136 days (Environment Canada).

Detailed descriptions of the climate, soils, geology and vegetation in the Pend d'Oreille are presented in Vold et al. (1980). Maps at a scale of 1:20,000 present the soil and vegetation types in a visual format on two sets of maps.

Physical characteristics of areas north of the Pend d'Oreille reflect the more mountainous terrain and higher elevations present in these areas. Vegetation types are primarily Interior Western Hemlock/Western Red Cedar and Subalpine Engelmann Spruce/Alpine fir. Precipitation is higher and temperatures are lower. However, winter snow depths are much greater and regularly exceed depths of 45 to 60 cm which are a severe hazard to white-tailed deer. Snow depths at elevations exceeding 6000' regularly build to 1.8 meters or more, far in excess of the depth white-tailed deer can survive in. These snow depths force the deer to migrate to winter range areas.

MANAGEMENT PLANNING

Development of management plans for the Pend d'Oreille Valley took place in a series of three steps. The first step was a meeting of intsrested clubs, private industry with concerns in the valley, resource agencies and concerned landowners to develop a Coordinated Resource Management Plan (CRMP). This took place in July 1977. The CRMP outlines problems and major impacts recognized in the Pend d'Oreille and identifies objectives to be met in managmeent of the valley. Specific statements on the handling of livestock grazing, tree

management, watershed values, recreation and wildlife are made. All participants in the Plan had opportunity for input and discussion during its development. In its final form, the CRMP was signed by the participants who agreed to act within the guidelines of the Plan as stated.

A CRMP provides only general guidelines on the management of a specific resource. In the section on wildlife, white-tailed deer are identified as the primary species of interest with low priority given to fish, upland birds, waterfowl, shore and wading birds and rare and endangered species due to the low capablity of the valley for these species. Forest management and range management practices were identified as the means by which deer habitat manipulations will be achieved.

The second plan development stage was research on the migration patterns, winter habitat selection and summer range selection of the white-tailed deer population. This phase began in 1974 and is ongoing. The bulk of the data collection was completed in 1979 and some date analysis is still in progress. The results of these studies are not included in this paper and will be reported separately. Information was used to make decisions on how to manage existing vegetation types and topographic areas for maximum white-tailed deer benefit. Partial summaries of research findings were reported in Vold et al. (1980) and Woods and Woods (1979).

The last phase of management plan development for the valley was to put together the information available in a detailed and specific plan. The plan was completed in the form of a lengthy document on over 500 vegetation/soil/topography sites throughout the valley. The management goals, objectives and constraints for the eight management units are presented in this paper. The remainder of the details are available but have not been published. Those wishing to review the detailed plans are welcome to contact the Nelson office of the Fish and Wildlife Branch.

THE SEVEN MILE DAM

In December 1979 the first of four generating units at the Seven Mile dam went into service. Flooding of the reservoir at that time inundated approximately 203 hectares between Church Creek and the Canada-USA over a distance of 13.5 km. All of the area flooded was considered to be winter range and 111 hectares of the area on the north side of the reservoir was considered to be prime white-tailed deer winter range. The Pend d'Oreille valley is narrow and steep, containing very little flood plain area (Vold et al. 1980). As a consequence, all of the flooded area is considered to be uplands, with no significant flood plain habitat losses. The reservoir is not used for flood control and will not normally be drawn down to any significant extent. Normal maximum pool elevation is 523 m.

Access to the construction site from the Columbia River valley, the nearest location of railways, highways and gravel for the concrete, was via a new road along the north side of the Waneta reservoir. A new highway was constructed along this route, eliminating or degrading a further 62 hectares of wintering area for mule deer in the Columbia River valley and white-tailed deer in the Pend d'Oreille valley. The road was built at low elevation through areas considered to be high quality winter range. Slopes in the area of the access highway are steep, resulting in extensive cutbacks and cliffs along the highway. Portions of the cutbanks will recover and provide future habitat for deer, but recovery will be slow due to poor soil conditions.

Access through the Pend d'Oreille valley from the Seven Mile dam to Nelway was cut by flooding of about 3.2 miles of the existing road. The road was replaced above the new reservoir level resulting in a further habitat loss of 5 hectares. The road follows the edge of the reservoir through prime white-tailed deer habitat.

Transmission lines related to the Seven Mile dam, the electricity grid connecting population centers in the Kootenays, and a connection with the U.S. electrical grid all traverse parts of the Pend d'Oreille valley in linking with the Selkirk Substation. This substation, 3 km north of the Seven Mile dam, will eventually link to 13 transmission lines. Six of these right-of-ways traverse portions of the winter range with a further three lines planned for the future. Habitat devoted to transmission lines is not lost to use by deer or elk, but can be of limited value. Management must be for shrubs or grasses in these areas, limiting the options and often providing continuous openings where cover is badly needed. The newly constructed transmission line skirts the upper end of the winter range and future lines will also be just above the winter range area. In these high elevation areas snow interception cover is important but cannot be provided. Habitat management complications of this sort are involved on about 400 hectares of winter range.

WILDLIFE

The Pend d'Oreille valley has been classified as Class 2 winter range in the CLI ungulate capability analysis report. It is one of only a few places in the West Kootenays classified that highly. Low snowfall and warmer temperatures result in less snow accumulation which in turn allows deer better access to low growing food species and reduces energy loss caused by movement through snow. Seral plant communities provide an interspersion of coniferous cover and shrub areas. Cover is necessary to reduce thermal energy loss and to reduce the snow pack through snow interception. Reduced snow depths among the trees also aids the movement of deer and elk between foraging areas. Seral shrub areas resulting primarily from fire provide food since the shrubs are low enough to be reached by feeding

deer. The shrub species which occur following fire are also beneficial as they are preferred food species for deer and elk.

White-tailed deer, as noted earlier, are the primary species of concern in the Pend d'Oreille valley. The population density throughout the valley is variable with a density of 14.2 deer/sq. km west of Nine Mile Creek and 38.5 deer/sq. km from Nine Mile Creek to the Salmo River mouth. The overall winter population in 1978/79 was 1171 ±159 deer. Population density differences are attributed to the inadequacy of the habitat in the low density areas. Detailed management plans have been developed to improve the habitat in these areas where the land is not controlled by private ownership. These plans are presented later.

In summer the white-tailed deer migrate over an area about 20 times the size of the winter range (Fig. 3). Valley bottoms and south aspects were selected by radio collared deer. The Beaver Valley and Salmo River valleys support more deer than surrounding tributaries, but migration as far as 30 km north into upper tributaries of North Fork Salmo River was recorded. White-tailed deer can be seen on the winter range area in summer, but densities are low.

Elk winter at the east end of the valley along the Salmo River and in scattered areas throughout the valley. A population of about 30 to 100 elk have been observed in the Salmo River area over the past 8 years, with historical records dating back more than 20 years. Lone bull elk seem to winter in scattered locations.

In spring during the elk migration up to 16 elk have been observed in the west end of the valley and near Lomond Lake in the east. In summer the elk disperse over a wide area in the Pend d'Oreille valley, high elevation sites between the Beaver Creek valley and the Pend d'Oreille, the Salmo River and the south fork of the Salmo River.

Mule deer are infrequently seen on the Pend d'Oreille winter range. Most of these deer move to the Columbia River valley and winter on the steep slopes and kame terraces north and south of the Canada/USA border. In summer mule deer are the most frequently observed ungulate species in the Pend d'Oreille valley.

The impact of Seven Mile dam on other wildlife species is considered to be minor. The swift nature of the river did not make it good habitat for waterfowl, or water dwelling fur-bearers. Ruffed grouse (Bonasa umbellus) are plentiful in the valley during good years, and the population will suffer in proportion to the amount of habitat lost. However, these grouse did not migrate or make special use of the newly flooded habitat. Nongame bird and mammal species, upland furbearers and most raptor species are in the same situation as the ruffed

grouse. The amount of habitat lost is directly related to the area flooded in the valley. Ospreys (Pandion haliaetus) are the only raptor which are significantly effected as the reservoir forms a different type of feeding habitat than the river.

ONGOING LAND USE DEMANDS

Construction of the Seven Mile dam has increased access to the Pend d'Oreille valley in all seasons. Where at one time there was a narrow gravel road to the central section of the valley, a paved highway is now present. Development in Trail and associated industrial park expansion in the Columbia Gardens area is expected to result in pressure to subdivide the western end of the valley. Potential park development along the new reservoir will increase the spring/summer/fall recreational use of the valley.

Road construction for transmission line, substation construction and logging have opened up areas of the valley not previously accessible by vehicle. These roads will result in increased hunting pressure on the resident deer population.

The forest resource has been utilized over the past forty years and little change in the pattern of use is attributed to the dam construction. Access to the south side of the reservoir via the dam will result in the resumption of logging in that area and opening up of the south side to hunting pressure.

Agricultural development in the valley is limited to low elevation kame terraces which produce limited amounts of alfalfa, hay and small home gardens. Grazing takes place on some of these terraces and the moderately sloping areas surrounding them. These activities are expected to remain constant. Crown grazing permits will be developed only through the Coordinated Resource Management Plan.

LAND USE PLANS

Management Compartments

The Pend d'Oreille Coordinated Resource Management Area has been subdivided at three levels to facilitate the development and organziation of detailed management plans. The scale of each subdivision reflects the detail of management outlined with generalized plans for the large units and detailed vegetation prescriptions for the small sites.

(a) Units - The entire CRMP area has been broken into 8 units (Figure 2). Six of these units make up the majority of the quality winter range area of primary concern to the Fish and Wildlife Branch. The remaining two units include the south side of the river (Unit 8) and the Remac-Nelway

Unit (Unit 7). Boundaries of the Units are topographic and generally extend from one major watercourse to the next, reflecting the habitat use of white-tailed deer in the valley.

(b) Areas - Each Unit has been broken into from 2 to 15 areas reflecting the topography and the use which wintering white-tailed deer make of the topography. In general, three topographic types effect deer use of an area through the winter. High elevation areas, generally above 900 m, accumulate excessive snow and are unsuitable for deer use during the critical deep snow period of mid to late winter. Aspect and slope have an influence on the effective elevation at which the high elevation sites begin. Management of these high elevation areas is for early winter use, prior to accumulation of snow to a depth which deer cannot handle. Forage production will be stressed, with provision of cover adequate to protect the deer and to provide movement corridors to lower elevation wintering areas.

Steep slopes at low elevation are the second topographic type. Most of the moderate to steep slopes in the valley on the prime winter range are southeast through southwest aspects. Solar radiation heating on these areas causes snow to melt throughout the winter and results in snow leaving these areas three or more weeks before it is gone on level slopes. Management prescriptions on these slopes are designed to provide openings where the sun has its greatest affect while promoting forage production. Coniferous cover will be maintained immediately adjacent to these open slopes to promote their use as the snow begins to leave and throughout the winter, where possible.

The third type of area in the valley is the moderately sloping to flat site at low elevation. On these sites, growth of good snow interception coniferous cover will be promoted. The cover will be removed in a forest rotation of about 100 years to produce a mixture of forage species and coniferous cover. Sites with adequate snow interception cover provide habitat during periods when snow depths in the open area are in excess of what white-tailed deer can handle.
A balance between the amount of cover and foraging area must be struck on all areas so that habitat for all possible winter conditions is provided. Topographic constraints limit what can be done for deer on some areas and the proportions of each topographic type in a unit controls the overall distribution of habitat types. Detailed plans within each area are designed to integrate areas and to develop the best possible distribution of habitat types.

One further type of area is distinguished in the detailed plans of the valley. Private property is not under the management jurisdiction of the Fish and Wildlife Branch and all private lots have been distinguished as separate areas. This separates private land from all public land management.

Management details for the areas which have been described in the valley are not provided in this paper due to the number of them and their bulk. These plans are available at the Nelson office of the Fish and Wildlife Branch for those who are interested.

(c) Sites - The third land management subdivision is directly associated with the vegetation present in 1975 according to maps provided by the Resource Management Branch (Vold et al. 1980). The sites are not permanent units but will vary as the vegetation is modified and managed. At the present time they indicate what the vegetation is and prescriptions for a site describe in detail the type of work needed to produce the desired deer habitat. An initial goal and prescription has been written for every site in the valley. Additional details on site management prescriptions are an ongoing job as management of an area is planned or takes place. As with the area management plans the site management plans have not been published due to their bulk. The documents are available at the Nelson office of the Fish and Wildlife Branch for those who have a particular concern.

Site management prescriptions have been produced for all land in the valley irregardless of ownership. This has been done to facilitate proper consideration of the habitat types available and the proportions needed to manage white-tailed deer. No management will be carried out on private land even though prescriptions have been written for them.

UNIT 1 - WEST END

Unit 1 extends from the Columbia River on the west to the eastern boundaries of District Lot 9425 and 8620 on the north side of the Pend d'Oreille River. Almost all of the unit is under private ownership and all good white-tailed deer habitat is privately owned. Mule deer winter range along the Columbia River is included in the unit and provides the only opportunity to manage deer at this time.

Early in this century toxic fumes from Cominco's smelter in Trail created a lack of winter snow interception cover which still exists. Improvement of the cover distribution on the kame terraces between the Columbia and the Pend d'Oreille Rivers is one of the most important areas for management to take place. This would overcome the lack of cover believed to be a major restriction to deer population growth.

Further into the Pend d'Oreille valley much of the terrain is moderately sloping and suitable for development of snow interception cover. Logging and hay crop production has resulted in a lack of adequate coniferous snow interception cover. If these areas were available for management, not privately owned, they would be treated to insure the development of a coniferous forest rotation with forage production in small openings. The fields would be reduced to about 20% of their present size to increase cover and forage availability.

Steep slopes extend along the entire lower portion of the unit. Management of these slopes involves maintenance of forage production through prescribed burning or mechanical means. Permanent snow interception cover will be developed or maintained on flat spots, at the top of the steep slopes and in draws. Private ownership of these slopes precludes management at this time.

UNIT 2 - SEVEN MILE CREEK

Unit 2 extends from the western boundary of District Lots 7195, 10920 and 6636 to Nine Mile Creek and includes land from the Pend d'Oreille River to the height of land between the Beaver Valley and the Pend d'Oreille valley. Ten areas have been identified, six of which are privately owned land parcels. The four remaining areas are primarily Crown land or B.C. Hydro property. Of these four, only two are high quality white-tailed deer winter range. Management of Unit 2 is therefore restricted to a small, but high quality, portion of the total unit.

The deer density west of Nine Mile Creek is 14.2 deer/sq. km, but the figure is not totally representative of Unit 2 since there are pockets of habitat which are well suited to support white-tailed deer. Apart from the pockets of good habitat, there is a lack of diversity in the habitat which reduces its value as deer winter range.

Management activities are designed to increase the habitat diversity. Area 1 was logged almost completely in the 1950's. The logging resulted in a lack of coniferous snow interception cover which currently does not allow full utilization of this habitat. Management prescriptions involve re-establishment of cover interspersed with foraging areas. Area 2 was not logged and is characterized by continuous coniferous cover lacking in forage for the deer. The goal here is to establish a forest rotation which will provide both the cover requirements and the forage needed to support deer. Permanent cover will be maintained along the transmission line to promote full utilization of the forage available within the cleared area. High elevation and private ownership preclude management activities on the remaining 8 areas in the unit.

UNIT 3 - NINE MILE CREEK

Nine Mile Creek on the west and Charbonneau Creek on the east are the boundaries of Unit 3. The northern boundary is the height of land between the Pend d'Oreille watershed and the Beaver Creek watershed, while the southern boundary is the Pend d'Oreille River. The white-tailed deer habitat in this unit is of high quality with a very good mixture of topographic habitat types. The vegetation present is also well suited to maintenance of wintering white-tailed deer with the exception of a few sites. Private ownership of the low elevation lands most suited to wintering deer makes management difficult at this time. Two mid-elevation areas under Crown jurisdiction provide an opportunity to manage some habitat.

Prescriptions for the unit involve improvement of the cover and forage interspersion on the benches and moderate slopes at low elevation. Fire following logging created very good forage supplies at the west end of the unit, but eliminated all significant cover. Fire and logging some time ago reduced the cover at the east end as well. Management activities would see that adequate snow interception cover develops. Some of the fields would also be converted to cover and shrub forage species if they were not privately owned.

Management of high elevation sites will be a problem since extensive root-rot (Armillaria mellea) centers exist in the area and are being logged out at the present time. Efforts will be made to preserve remaining cover not effected by root rot and to improve the forage in logged openings.

Two areas of steep south aspect extend across the unit and provide ideal habitat for use as the snow leaves because of the effects of the sun. Most of this habitat is owned by B.C. Hydro and may be purchased when it is available. The areas presently available to the Fish and Wildlife for management will be treated to maintain the cover and to improve forage quality by burning at 30 to 40 year intervals.

Unit 3 will receive moderate priority for management input until the land is purchased from B.C. Hydro. Trespass grazing will be controlled to prevent cattle from browsing valuable deer winter forage. Interaction with the Ministry of Forests to manage the root rot problem for the joint benefit of deer and the forest resource will be continued.

UNIT 4 - CHARBONNEAU CREEK

Tillicum Creek and Charbonneau Creek form the east and west boundaries of Unit 4. On the south the Pend d'Oreille River is the boundary while the height of land into the Beaver Valley forms the north edge. Virtually all of this unit is public or is owned by B.C. Hydro with the B.C. Fish and Wildlife Branch holding a purchase option. The unit is very well suited to white-tailed deer and it is presently the most heavily used portion of the valley in winter. Pellet group results indicate a wintering population of 89 deer/sq. km.

The distribution of cover and forag is good throughout the unit although opportunities exist or improvement through management.

Management prescriptions are designed to maintain the cover on most sites while improving the forage quality and quantity. Dense shrub stands formerly suitable for deer browse have grown out of reach. These will be treated by burning or mechanical means to cause basal resprouting, thus increasing the forage available.

Cover areas consisting of patches of Douglas-fir or ponderosa pine are located in most of the draws and on other mesic sites. Most of these cover sites should be protected to encourage a broader area of deer dispersal during mid-winter deep snow periods. Cover on some low elevation sites along the reservoir and on the bench which the road traverses is lacking in snow interception value. Conifer regeneration on these sites will be assessed and planting should be undertaken to return most sites to snow interception cover. A rotation of cover and openings is desirable on some of these slopes.

Cover should be maintained along the majority of the double transmission line near the middle of the unit to insure the most complete possible use of browse available on these lines. Regeneration of desirable browse species on much of the line has been slow due to grass seeding following clearing.

Fields near the road at the west side of the unit should be treated to maintain grass quality for spring use. Methods include ploughing, seeding, fertilization, brush removal, grazing and knapweed control.

UNIT 5 - TILLICUM CREEK

The east boundary of Unit 5 is McCormick Creek and the upper reaches of the Wallack Creek drainage. On the west Tillicum Creek forms the entire boundary while the south edge is the Pend d'Oreille River and the Salmo River. The deer population in the unit is moderate and variable as some areas are very well suited to deer use while other areas have been adversely effected by logging.

Private land ownership within Unit 5 limits management possibilities on about one-third of the land area. These lands form an almost continuous unit near the confluence of the Salmo and Pend d'Oreille River while Crown lands and land owned by the Fish and Wildlife Branch form a nearly continuous unit surrounding the private land. As a result, management activities on public lands will not be seriously curtailed by private property.

Management of land owned by the Fish and Wildlife Branch in Unit 5 is our first priority in the valley. Coniferous cover regeneration on much of the flat to moderately sloping

lan s on the west end of the unit is necessary as recent logging has severely reduced the proportion of cover. Natural regeneration will be supplemented with tree planting on fields and in areas where inadequate natural restocking is occuring. The large area of field on this unit will be reduced as fields are of little value to deer during the important deep snow periods of mid-winter. On steep slopes suitable for browse production and deer use in the late winter period the cover is generally good at this time. Controlled burning will be used at 20 to 40 year intervals to improve shrub species useful as deer food. Coniferous cover will be permanently maintained at the top and edge of most of these browse areas to promote use throughout the winter.

Much of Unit 5 is not suitable as winter range due to its high elevation. Most of these lands lie in the north-eastern portion of Tillicum Creek watershed. Below 1067 m these lands may be managed for use in early winter prior to heavy snow accumulation. Above 1067 m the area is of little value to deer in winter and should be managed for other resource values, particularly timber production.

UNIT 6 - WALLACK CREEK

Wallack Creek Unit extends from McCormick Creek on the west to the western edge of the Pete Creek drainage. The southern boundary is the Salmo River while the northern boundary is defined by the upper limits of the Wallack Creek drainage. Most of the unit is publicly owned and some of it was recently purchased by the Fish and Wildlife Branch, returning it to public ownership. Two private holdings at the west side of Unit 6 are on quality winter range. Neither owner lives on the property, and these properties are not considered available for habitat manipulation.

Wallack Creek management unit provides only moderate habitat conditions for white-tailed deer at the present time. Pellet group data indicates the presence of only 12 deer per sq. kilometer.

Topography on this unit is very variable. Wallack Creek creates a deep draw, much of which is of reduced winter value to deer as the sides of the draw are east and west aspects and accumulate excessive amounts of snow. A band of steep south aspect traverses the unit at low elevation and provides good sites for foraging and late winter use. Low elevation and mid-elevation flats and moderately sloping terraces provide sites suitable for mid-winter snow interception. High elevation sites are moderately sloping and extend far into the upper reaches of Wallack Creek. Some of this habitat is suitable for mid-winter cover/forage rotation development. Sites above 1350 m generally experience excessive snow accumulation during winter and are not suitable for deer use or management.

Particular emphasis will be placed on maintenance of permanent cover at the base and top of steep south aspects to

provide bedding sites. Dense coniferous cover will also be maintained along the boundaries of the transmission line in order to encourage deer to use the forage these areas provide during mid-winter. Management efforts will also go to development of good snow interception cover on flat to moderately sloping sites below 1350 m.

UNIT 7 - REMAC

Remac management unit extends from the Canada/USA border north to the Salmo River. On the west the Pend d'Oreille River forms the boundary while on the east Highway 6 is the boundary. Almost all of the good deer winter range on the unit is privately owned leaving almost no area available for management.

Observed deer use of Remac Unit has been low. Snow accumulation on the unit is greater than on other units in the valley due to an increase in precipitation in the east. The increased snowfall, combined with a lack of good snow interception cover, results in poor conditions for white-tailed deer during the critical deep snow period.

Management efforts in the unit should be minimal for the near future as most of the habitat is either privately owned or is on the north aspect which is of no value as winter range. In the event that land in the unit becomes the property of the Fish and Wildlife Branch, efforts will still be less than on more important winter range units to the west because of lower winter range quality.

Habitat manipulations planned for Remac Unit are designed to increase the value of the habitat for early winter and early spring use as well as migration use. Improvement of range for that time period will reduce the pressure on critical mid-winter and late winter habitat in the drier portions of the valley. Manipulations recommended involve establishment and control of coniferous cover in the unit in a configuration which will improve access to forage areas while still providing access to better mid-winter habitat via cover corridors.

A few small areas of steep south aspect are present on the unit. If these become available for management, an effort should be made to improve the sites for late winter use by prescribed burning. Development of suitable snow interception and hiding cover on adjacent sites is also recommended. Provision of a complete range of habitat needs near these steep south aspects may hold some deer for the whole winter.

UNIT 8 - SOUTH SIDE

The Pend d'Oreille River, the Columbia River and the Canada/USA border enclose Unit 8. It is a much larger management unit than the other seven due to its low value as winter range for white-tailed deer. Almost all of the low

elevation land on the south side is privately owned, precluding management of the few spots where management input would be of significant value.

Snow accumulation on the predominant northerly aspects of Unit 8 is greater than on adjacent units north of the river. The snow depths result in a few deer wintering on this part of the range during the most severe part of the winter. Low elevation sites do support deer early in the winter prior to the build up of snow depths. Holding deer on this range early in the winter will reduce their impact on the more critical winter range.

Management activities recommended for improvement of the range involve interaction with the Ministry of Forests and with private owners where possible, to develop logging plans suitable for maintenance or enhancement of habitat useful in the early part of the winter. Management for early winter deer use involves production of extensive forage openings with cover corridors to facilitate deer movement between forage sites and movement to the higher quality wintering areas. In addition cover areas will provide protection during periods of poor weather.

Road access to the south side of the Pend d'Oreille via the top of the Seven Mile Dam will provide a route to the South Side Unit where in the past it was necessary to travel through the U.S.A. Logging is expected to begin in the near future on sites made available via the dam, therefore interaction with the Ministry of Forests will continue in order to achieve the best possible management. No other significant land use impact are anticipated.

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POOR

QUALITY

ORIGINAL